CLAIMS

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A method for producing very high crown and camber curvature in slider materials having a flex side and an air-bearing side using a laser processing system which produces a pulsed laser beam, comprising the steps of:

(A) establishing a focal plane for the laser beam, the laser beam having a pulse width in the range of 1×10^{-9} seconds to 1×10^{-3} seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400 kHz;

(B) applying the pulsed laser beam to the flex side of the slider material; and

(C) varying the relative positions of the slider material and the focal plane of the laser beam to optimize the curvature.

2. The method of claim 1, wherein the laser processing system further comprises a focusing device, whereby the focal plane of the laser beam is established.

3. The method of claim 2, wherein said focusing device is at least one lens mounted on a moveable stage, whereby the position of the focal plane relative to the slider material can be varied.

4. The method of claim 1, wherein the laser processing system further comprises a movable stage to which the slider material is attached, the position of the slider material relative to the focal plane can be varied.

5. The method of claim 1, wherein the laser is Q-switched.

6. The method of claim 1, wherein the laser beam is conditioned with a beam expander with adjustable beam expansion.

7. The method of claim 1, wherein the laser beam is produced through harmonic generation.

8. The method of claim 1, wherein the laser beam is moved by at least one directing optic.

9. The method of claim 8, wherein at least one directing optic includes at least one reflecting mirror.

10. The method of claim 1, wherein the slider material is one or more rows of sliders.

11. A method for producing very high crown and camber curvature in slider materials having a flex side, using a laser processing system which produces a laser beam which produces fluence which is variable in a controllable manner, comprising the steps of:

(A) applying the laser beam to the flex side of the slider material, the laser beam having a pulse width in the range of 1 X 10^{-9} seconds to 1 X 10^{-3} seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400 kHz; and

(B) varying the fluence of the laser to optimize the curvature in the slider material.

12. The method of claim 11, wherein fluence is controllably varied by changing the power output of the laser.

13. The method of claim 11, wherein fluence is controllably varied by changing the spot size of the laser beam.

14. The method of claim 13, wherein the spot size of the laser beam is varied by changing the relative positions of the slider material and the focal plane of the laser beam.

15. The method of claim 14, wherein the spot size is controllably varied by moving the focal plane of the laser beam relative to the slider material.

16. The method of claim 15, wherein the focal plane of the laser is moved relative to the slider material by using at least one focusing lens which is attached to a movable mount.

17. The method of claim 14, wherein the slider material is moved relative to the focal plane of the laser by using a movable mount to which the slider material is attached.

18. The method of claim 11, wherein fluence is controllably varied by adjusting the beam expansion of the laser beam.

19. The method of claim 11, wherein the slider material is one or more rows of sliders.

20. An apparatus for creating high crown and camber curvature in slider materials having an air bearing surface and a flex side, comprising:

a laser which produces a pulsed laser beam for machining the slider material, the laser beam having a pulse width in the range of 1×10^{-9} seconds to 1×10^{-3} seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400 kHz;

at least one beam directing device, which directs the laser beam onto the flex side of the slider material; and

a fluence varying device so that optimal fluence is achieved to produce optimal curvature.

21. The apparatus of claim 20, wherein:

the fluence varying device is at least one focusing lens which directs the laser beam to focus within a focal plane and a movable fixture which varies the position of the slider material with respect to the focal plane.

22. The apparatus of claim 21, wherein:

the movable fixture is a movable stage upon which the slider material is attached, and by which the slider material is moved relative to the focal plane.

23. The apparatus of claim 21, wherein:

the movable fixture is a movable stage upon which the lens is attached, and by which the focal plane is moved relative to the slider material.

24. The apparatus of claim 20, wherein the laser is Q-switched.

25. The apparatus of claim 20, wherein the laser beam is produced through harmonic generation.

26. The apparatus of claim 20, wherein the laser beam is moved by at least one directing device.

27. The apparatus of claim 26, wherein at least one directing optic includes at least one reflecting mirror.

28. The apparatus of claim 20, wherein the laser beam is conditioned with a beam expander that has adjustable beam expansion.

29. The apparatus of claim 20, wherein the slider material is one or more rows of sliders.

30. A slider having optimized crown or camber curvature prepared from substrate material having an air-bearing side and a flex side, prepared by a process using a laser which produces a pulsed laser beam, the laser beam having a pulse width in the range of 1 X 10^{-9} seconds to 1 X 10^{-3} seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400 kHz, the process comprising the steps of:

(A) applying the laser beam to the flex side of the substrate material; and

(B) varying the fluence of the laser beam to optimize the curvature in the substrate material.

31. A slider prepared by the process of claim 30, wherein fluence is controllably varied by changing the power output of the laser.

32. A slider prepared by the process of claim 30, wherein fluence is controllably varied by changing the spot size of the laser beam.

33. A slider prepared by the process of claim 32, wherein the spot size of the laser beam is varied by changing the position

of the substrate material relative to the focal plane of the laser beam.

34. A slider prepared by the process of claim 32, wherein the spot size is controllably varied by changing the position of the focal plane of the laser beam relative to the substrate material.

35. A slider prepared by the process of claim 34, wherein the focal plane of the laser is moved relative to the substrate material by using at least one focusing lens which is attached to a movable mount.

36. A slider prepared by the process of claim 30, wherein the laser beam is conditioned with a beam expander that has adjustable beam expansion.

37. A slider prepared by the process of claim 30, wherein the substrate material is one or more rows of sliders, which are then separated to produce individual sliders.